

CV of Prof. Helge Weman

- *Date and place of birth:* August 25th, 1960 in Stockholm, Sweden
- *Nationality:* Norwegian and Swiss
- *Homepage:* <http://www.iet.ntnu.no/~weman/>

Academic Degrees

- 1992: *Docent habilitation (Materials science):* Linköping University, Sweden.
- 1988: *PhD (Materials science):* Linköping University.
Thesis title: "Optical studies of excitonic impact ionization and complex defects in silicon"
Thesis advisor: Prof. Bo Monemar. Thesis opponent: Prof. Hans-Joachim Queisser.
- 1983: *Master of Science (Applied physics):* Linköping Inst. of Technology, Sweden.

Employment

- 2010- : *Scientific advisor*, SINTEF Materials and Chemistry, Trondheim, Norway.
- 2005- : *Professor in "Nano-electronics and nano-photonics"* at Dept. of Electronics and Telecom., Norwegian University of Science and Technology (NTNU), Trondheim, Norway.
- 1996-2005: *Senior scientist and project leader*, Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland. In Prof. Eli Kapon's research group.
- 1997 - 2005: *Associate professor* at Linköping University (Part time ~ 20 %/ year).
- 1992 - 1996: *Assistant professor* at Linköping University.

Visiting Assignments

- Jan. – July 2011. *Visiting scientist (on sabbatical leave)*, IBM Zürich Research Lab, Rüschlikon, Switzerland.
- July – Dec. 2008. *Visiting professor (on sabbatical leave)*, Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland.
- 1993 - 2002. *Visiting scientist*, Grenoble High Magnetic Field Laboratory, France.
Collaboration with Dr. M. Potemski. (About 1 month/year).
- Oct. 1993 - March 1994: *Visiting associate professor*, NTT Opto-electronics Lab, Photonic Functional Device Lab, Atsugi, Japan. With Dr. M. Notomi and Dr. T. Takamura.
- Aug. 1989 - Nov. 1991: *Post. doc.* at Center for Quantized Electronic Structures (QUEST), University of California, Santa Barbara, USA. With Profs. J.L. Merz, P.M. Petroff, and H. Kroemer (Nobel physics laureate in 2000).

Fellowships Awarded

- 1992-1995: *Research associate fellowship*, Swedish Research Council for Engineering Sciences.
- 1990: *Post doctoral fellowship*, Swedish Natural Science Research Council.

Present PhD Students at NTNU (6)

- Main supervisor: Mazid Munshi ('10-), Lyubomir Ahtapodov ('09-), Christian Weigand ('07-), Fervin Moses, ('07-),
- Co-supervisor: Jelena Todorovic ('09-), Guro Kristin Svendsen ('07-).

Former PhD Students (6)

- Dheeraj Dasa, NTNU ('10), Fredrik Karlsson, Linköping University ('04), Lorenzo Sirigu (co-supervisor), EPFL-Lausanne ('02), Johan Hammersberg, Linköping University ('98), Masaya Notomi (co-supervisor), NTT and Linköping University ('97), Mark S. Miller (co-supervisor), Univ. of California Santa Barbara ('92).



Supervision of Postdocs at NTNU

- Present: Phillip Olk ('10-), Dong-Chul Kim ('09-).
- Former: Hailong Zhou ('08/'09), now at UCLA, Thang Ba Hoang ('08/'09), now at University of Eindhoven.

Undergraduate Teaching

- *Nanophotonics*. At NTNU ('10-).
- *Solid state materials and Nanostructures*. At NTNU ('07-'09).
- *Introduction to Nanotechnology*. At NTNU ('06-).
- *Optoelectronics*. At Linköping University ('96-'05).
- Also taught several other courses as guest lecturer in PhD and undergraduate courses at LiU, EPFL and now at NTNU since 2005.

Present Honors, Memberships, Committees

- 2010- Elected member of Norwegian Academy of Technological Sciences (NTVA).
- Member of Norwegian Solar Cell Technology Center.
- Member of European Physical Society.
- Member of Materials Research Society.
- Member of Society of Photographic Instrumentation Engineers (SPIE).
- Member of "NTNU-NanoLab" leader group.
- Member of study board for "Master of Nanotechnology" at NTNU.
- Program committee of "Nanowire growth workshop", Rome, Italy, Nov. 2010.
- Program committee of "ICOOPMA 10" conference, Budapest, Hungary, Aug. 2010.
- Organizing committee of "Norwegian Electro-Optics meeting", Ålesund, Norway. April 2010.
- Journal referee for: Nature Nanotechnology, Nano Letters, Nanotechnology, Phys. Rev. Lett., Phys. Rev. B., Appl. Phys. Lett, Semicond. Sci. Tech., J. Cryst. Growth.

Present Research Projects

- 2010-2013. "*Semiconductor nanowire based solar cells*", funded by the TopLevel Research Initiative of the Nordic Innovation Center. I am consortium leader on this project that includes Lund Univ, Aalto Univ, KTH, Sol Voltaics AB and Obducat AB.
- 2009-2013. "*Development of semiconductor nanowire based solar cells*", funded by the RENERGI program of the Research Council of Norway.
- 2007-2012. "*Modeling and fabrication of nanowire lasers*", funded by the NANOMAT program of the Research Council of Norway.
- 2007-2011. "*Nanostructured oxide thin films for organic/inorganic solar cell applications*", funded by the NANOMAT program of the Research Council of Norway.

Research interest: Nanophotonic Materials and Devices

- Since 2005 I lead a research group at NTNU of about 10 researchers that fabricates and characterizes nano-scale semiconductor materials like heterostructured III-V semiconductor nanowires and ZnO nanowires. We fabricate our nanostructures with atomic precision using a molecular beam epitaxy system at our institute. We study also applications of nanomaterials in optical devices such as solar cells, light emitters and sensors. Of particular interest is the electrical and optical characterization of these nano systems using techniques such as nano-luminescence microscopy. At the institute I also have an advanced nano-photonics laboratory, based on a scanning confocal optical microscope, where we can measure the light from single nanoparticles down to low temperatures (-271 Celsius), time-resolved (pico/femto seconds), and at high magnetic fields (11 Tesla).



Publications (Interactive list at: <http://www.iet.ntnu.no/~weman/publist.pdf>)

- h-index: 16
- Internationally refereed journal papers: 75 (+ ca. 150 conference papers).
- 20 invited conference talks, 3 invited book chapters.

10 key publications

1. Serpentine superlattice quantum-wire arrays of (Al, Ga)As grown on vicinal GaAs substrates
M.S. Miller, **H. Weman**, C.E. Pryor, M. Krishnamurthy, P.M. Petroff, H. Kroemer, and J.L. Merz,
Phys. Rev. Lett. **68**, 3464-3467 (1992).
2. Optical anisotropy in a quantum-well-wire array with two-dimensional quantum confinement-Comment
H. Weman, M.S. Miller, and J.L. Merz,
Phys. Rev. Lett. **68**, 3656 (1992).
3. Polarization and broken symmetry due to anisotropic "tri-axial" strain in lattice-mismatched quantum wires
M. Notomi, J. Hammersberg, J. Zeman, **H. Weman**, M. Potemski, H. Sugiura, and T. Tamamura,
Phys. Rev. Lett. **80**, 3125 (1998).
4. Optical detection of microwave-induced impact ionization of bound excitons in silicon
H. Weman, M. Godlewski, and B. Monemar,
Phys. Rev. B **38**, 12 525-12 530 (1988).
5. Strain-induced quantum confinement of carriers due to extended defects in silicon
H. Weman, B. Monemar, G.S. Oehrlein, and S.J. Jeng,
Phys. Rev. B **42**, 3109-3112 (1990).
6. Reactive-ion- and plasma-etching-induced extended defects in silicon studied with photoluminescence
H. Weman, J.L. Lindström, G.S. Oehrlein, and B.G. Svensson,
J. Appl. Phys. **67**, 1013-1021 (1990).
7. Measuring linear polarization of photoluminescence and photoluminescence excitation using a photoelastic modulation technique
M. Wassermeier, **H. Weman**, M.S. Miller, P.M. Petroff, and J.L. Merz,
J. Appl. Phys. **71**, 2397-2402 (1992).
8. Selective carrier injection into V-groove quantum wires
H. Weman, E. Martinet, A. Rudra, and E. Kapon,
Appl. Phys. Lett. **73**, 2959 (1998).
9. Two dimensional quantum-confined-Stark-effect in V-groove quantum wires: Excited state spectroscopy and theory
H. Weman, E. Martinet, M.-A. Dupertuis, A. Rudra, K. Leifer, and E. Kapon,
Appl. Phys. Lett. **74**, 2334 (1999).
10. High internal quantum efficiency, narrow linewidth InGaAs/GaAs/AlGaAs quantum wire light emitting diode
H. Weman, L. Sirigu, K.F. Karlsson, K. Leifer, A. Rudra, and E. Kapon,
Appl. Phys. Lett. **81**, 2839 (2002).

5 key publications from my group at NTNU since 2008:

11. Growth and characterization of wurtzite GaAs nanowires with defect-free zinc blende GaAsSb inserts
D.L. Dheeraj, G. Patriarche, H. Zhou, T.B. Hoang, A.F. Moses, S. Grønsberg, A.T.J. van Helvoort, B.-O. Fimland, and **H. Weman**, Nano Lett. **8**, 4459 (2008).
12. Zinc blende GaAsSb nanowires grown by molecular beam epitaxy
D.L. Dheeraj, G. Patriarche, L. Largeau, H.L. Zhou, A.T.J. van Helvoort, F. Glas, J.C. Harmand, B.-O. Fimland, and **H. Weman**, Nanotechnology **19**, 275 605 (2008).
13. Observation of free exciton photoluminescence emission from single wurtzite GaAs nanowires
T.B. Hoang, H. Zhou, A.F. Moses, D.L. Dheeraj, B.-O. Fimland, and **H. Weman**,
Appl. Phys. Lett. **94**, 133105 (2009)
14. Wurtzite GaAs/AlGaAs core-shell nanowires grown by molecular beam epitaxy
H. Zhou, T.B. Hoang, D.L. Dheeraj, A.T.J. van Helvoort, L. Liu, J.C. Harmand, B.-O. Fimland, and **H. Weman**
Nanotechnology **20**, 415 701 (2009).
15. Engineering parallel and perpendicular polarized photoluminescence from a single semiconductor nanowire by crystal phase control
T.B. Hoang, A.F. Moses, L. Ahtapodov, H. Zhou, D.L. Dheeraj, A.T.J. van Helvoort, B.-O. Fimland, and **H. Weman**,
Nano Lett. **10**, 2927 (2010).